

Claim Amendments

Pursuant to revised 37 CFR 1.121, a complete listing of all claims in the application follows along with a parenthetical expression of the status of each claim. No new matter has been added.

1. (Previously presented) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members of the plurality of contact nodes;
a time sharing frequency controller to control a time sharing frequency amongst the plurality of contact nodes, thereby allowing an arc to discharge continuously between the cathode and an anode; and
wherein the negative pole further comprises a constant contact mechanism with a rotating switch pole.
2. (Canceled)
3. (Previously presented) The apparatus of claim 1, wherein the constant contact mechanism further comprises a shaft around which rotates the rotating switch pole, said rotating switch pole further comprising a cylindrical body having at least one insulated segment and one conductive segment, wherein the insulated and the conductive segments alternately contact a fixed first contact which is electrically connected to a first cathode contact node and alternately contacts a fixed second contact which is electrically connected to a second contact node.
4. (Original) The apparatus of claim 3, wherein the anode further comprises an inside segment of an interior wall of a vacuum chamber, the cathode is mounted inside the vacuum chamber, and the switch is mounted outside the vacuum chamber.
5. (Original) The apparatus of claim 4, wherein the time sharing frequency controller further comprises a variable speed motor rotating the rotating switch pole.

6. (Original) The apparatus of claim 3, wherein the fixed first and second contact each further comprise an electrical contact brush.

7. (Previously presented) A current toggle switch for a cathode in a vacuum chamber, said current toggle switch comprising:

a cathode means functioning to form an arc between itself and an anode means;

said cathode means having at least two contact node means functioning to steer the arc across a target surface of the cathode means;

a current switching means functioning to controllably direct a current flow from one

contact node means to another contact node means and provide a momentary overlap of the current between the first and second contact node means; and

wherein the current switching means further comprises a variable speed motor rotating a disc means having a conductive segment and a non-conductive segment, wherein the conductive segment alternately electrically contacts said contact node means.

8. (Canceled)

9. (Currently Amended) In a vacuum arc deposition system having a vacuum chamber, an anode and a cathode, wherein an arc discharges between the anode and the cathode, an improvement comprising:

a cathode having a plurality of electrical contacts;

a rotating cathode current source; and

a fixed electrical contact hub for each electrical contact; and

wherein the rotating cathode current source contacts each fixed electrical contact hub to provide a momentary overlap of current between a pair of fixed electrical contact hubs before directing all the current to the next member of the pair of fixed electrical contact hubs, thereby causing the arc to be steered by the movement of current amongst the plurality of electrical contacts in a continuous manner without interruption.

10. (Original) The improvement of claim 9, wherein the rotating cathode current source further comprises a disc having a peripheral contact edge, said edge having a conductive and a non-conductive segment.

11. (Original) The improvement of claim 10, wherein the rotating cathode current source further comprises a central shaft supplying the cathode current to the conductive segment.

12. (Original) The improvement of claim 11 further comprising a variable speed motor to rotate the rotating cathode current source.

13. (Original) In a vacuum arc deposition system having a vacuum chamber, an anode and a cathode, wherein an arc discharges between the anode and the cathode, an improvement comprising:

a cathode having a plurality of electrical contacts;

a rotating cathode current source;

a fixed electrical contact hub for each electrical contact;

wherein the rotating cathode current source contacts each fixed electrical contact hub to provide a momentary overlap of current between a pair of fixed electrical contact hubs before directing all the current to the next member of the pair of fixed electrical contact hubs, thereby causing the arc to be steered by the movement of current amongst the plurality of electrical contacts in a continuous manner without interruption;

wherein the rotating cathode current source further comprises a disc having a peripheral contact edge, said edge having a conductive and a non-conductive segment;

wherein the rotating cathode current source further comprises a central shaft supplying the cathode current to the conductive segment; and

wherein a variable speed motor rotates the rotating cathode current source.

14. (Original) In a vacuum arc deposition system having a vacuum chamber, an anode and a cathode, wherein an arc discharges between the anode and the cathode, an improvement comprising:

a cathode having a plurality of electrical contacts;

a reciprocating cathode current source;

a fixed contact hub connected to each cathode electrical contact; and

wherein the reciprocating cathode current source sequentially contacts each fixed contact hub to provide a momentary overlap of current before directing all the

current to the next fixed contact hub to be contacted, thereby causing the arc to be steered by the movement of current between the plurality of cathode electrical contacts in a continuous manner without interruption.

15. (Original) In a vacuum arc deposition system having a vacuum chamber, an anode and a cathode, wherein an arc discharges between the anode and the cathode, an improvement comprising:

- a plurality of cathodes each having a plurality of electrical contacts;
- a switching cathode current source to provide an arc simultaneously to each cathode;
- said switching cathode current source having a separate switch for each cathode; and
- wherein the switching cathode current source contacts a first and a second electrical contact on each cathode to provide a momentary overlap of current between them before directing all the current to the next contact in line to be contacted, thereby causing several arcs each to be steered by the movement of current between the plurality of cathode electrical contacts on each cathode in a continuous manner without interruption.

16. (Currently amended) A current toggle switch for a cathodic arc, said switch comprising:

- a negative pole;
- a cathode body having a plurality of contact nodes;
- an anode;
- a power supply to sustain an arc between the cathode and the anode;
- a switch connecting the negative pole to each cathode contact node in a time sharing mode;
- a time sharing frequency controller to control a time sharing frequency amongst the plurality of cathode contact nodes; ~~and~~
- a cathodic arc target attached to said cathode body; said cathodic arc target having an erosion surface; an insulator member of electronically non-conductive material, said insulator member being disposed around said cathode body and insulating said cathode body from the walls of said chamber;

said cathode body being positioned within said insulator member and said cathodic arc target being positioned in electrical contact with said cathode body, a gap between the cathode body and the insulator member, and a gap between the cathodic arc target and the insulator member;

said insulator member cross-section having a “C” shape, with a pair of ends aligned with a plane of the target erosion surface;

said cathode body having a back side; and

a magnet mounted to the back side so as to face the insulator member.

17. (Canceled)

18. (Original) In a vacuum arc deposition system having a vacuum chamber, an anode and a plurality of cathodes, wherein an arc discharges between the anode and each cathode, an improvement comprising:

each cathode having a plurality of electrical contacts;

a cathode current controller;

said cathode current controller having a current input, a plurality of current outputs, a logic module to control desired combinations of inputs to outputs; and

wherein the cathode current controller for each cathode sequentially contacts a first and a second electrical contact to provide a momentary overlap of current between them before directing all the current to the second electrical contact, then repeating the process to the next in line to be contacted, thereby causing an arc on each cathode to be steered by the movement of current between the plurality of cathode electrical contacts in a continuous manner without interruption.

19. (Original) A starter for an arc in a cathodic arc vapor deposition chamber, said starter comprising:

a cathode having a negative potential;

a target attached to the cathode;

a striker assembly attached to the target;

said striker assembly comprising an electrically insulating solid core having a conductive outer surface;

said conductive outer surface having a physical contact with the target;
a switch connected between the striker's conductive outer surface and a source of a different potential than the cathode;
wherein a momentary closure of the switch causes a current flow through the conductive outer surface, thereby depleting the conductive outer surface and creating a spark to initiate an arc to an anode; and
wherein the target re-coats the striker during a cathodic arc deposition process.

20. (Previously presented) A cathodic arc cathode within a chamber, said cathode having a cathodic arc target, said cathodic arc target having an arc evaporation surface;
a cathode body;
an insulator member of electronically non-conductive material, said insulator member being disposed around said cathode body and insulating said cathode body from the walls of said chamber;
said cathode body being positioned within said insulator member and said cathodic arc target being positioned in electrical contact with said cathode body, a gap between the cathode body and the insulator member and a gap between the cathodic arc target and the insulator member;
said insulator member cross-section having a "C" shape, with a pair of ends aligned with a plane of a target arc evaporation surface;
an adjustment mechanism to adjust the pair of ends to maintain the alignment with the target arc evaporation surface as the target arc evaporation surface erodes;
said cathode body having a plurality of contact nodes; and
a time sharing frequency controller to control a time sharing frequency amongst the plurality of cathode contact nodes without a use of an arc sensor.

21. (Previously presented) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members of the plurality of contact nodes;

- a time sharing frequency controller to control a time sharing frequency amongst the plurality of contact nodes without a use of an arc sensor, thereby allowing an arc to discharge continuously between the cathode and an anode; and
said cathode having a back side with a magnet mounted thereon.
22. (Original) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members of the plurality of contact nodes;
a time sharing frequency controller to control a time sharing frequency amongst the plurality of contact nodes, thereby allowing an arc to discharge continuously between the cathode and an anode;
a target mounted to the cathode and having an erosion surface; and
said erosion surface having a pattern of grooves, thereby causing a pattern of vapor flux to focus on a workpiece.
23. (Previously presented) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members of the plurality of contact nodes;
a time sharing frequency controller to control a time sharing frequency amongst the plurality of contact nodes without a use of an arc sensor, thereby allowing an arc to discharge continuously between the cathode and an anode; and
wherein the cathode is powered by a pulsing current.
24. (Canceled)
25. (Canceled)
26. (Currently Amended) A toggle switch comprising:
a negative pole;

a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members
of the plurality of contact nodes without a use of an arc sensor;
a time sharing frequency controller to control a time sharing frequency amongst the
plurality of contact nodes, thereby allowing an arc to discharge continuously
between the cathode and an anode; and
wherein the cathode is a cylinder which supports a cylindrical target mounted on an
inside surface thereof, thereby facilitating a coating of an outside surface of a
workpiece disposed inside the ~~cylinder~~ cylinder.

27. (Original) The apparatus of claim 26, wherein the cylinder is elongated having at least two pair of electrical contacts.

28. (Currently amended) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;
said time sharing mode comprising a momentary overlap between switched members
of the plurality of contact nodes without a use of an arc sensor;
a time sharing frequency controller to control a time sharing frequency amongst the
plurality of contact nodes, thereby allowing an arc to discharge continuously
between the cathode and an anode; and
said cathode further comprises a cathode cylindrical body having an outer surface to
support a cylindrical target, thereby facilitating a coating on a workplace
disposed around the cylindrical target.

29. Canceled

30. (Currently amended) A toggle switch comprising:
a negative pole;
a cathode having a plurality of contact nodes;
a switch connecting the negative pole to each contact node in a time sharing mode;

said time sharing mode comprising a momentary overlap between switched members of the plurality of contact nodes; and
a time sharing frequency controller to control a time sharing frequency amongst the plurality of contact nodes without a use of an arc sensor, thereby allowing an arc to discharge continuously between the cathode and an anode.

31. (Previously presented) The apparatus of claim 30, wherein the negative pole further comprises a constant contact mechanism with a rotating switch pole.

32. (Previously presented) The apparatus of claim 30, wherein the time sharing frequency controller is electronic.

33. (Previously presented) A current toggle switch for a cathode in a vacuum chamber, said current toggle switch comprising:

a cathode means functioning to form an arc between itself and an anode means;
said cathode means having at least two contact node means functioning to steer the arc across a target surface of the cathode means; and
a current switching means functioning to controllably direct a current flow from one contact node means to another contact node means and provide a momentary overlap of the current between the first and second contact node means without a use of an arc sensor.

34. (Previously presented) The apparatus of claim 33, wherein the current switching means further comprises a variable speed motor rotating a disc means having a conductive segment and a non-conductive segment, wherein the conductive segment alternately electrically contacts a contact node means.

35. (Previously presented) The apparatus of claim 33, wherein the current switching means is electronic.

36. (Previously presented) A current toggle switch for a cathodic arc, said switch comprising:

a negative pole;
a cathode body having a plurality of contact nodes;
an anode;
a power supply to sustain an arc between the cathode and the anode;

a switch connecting the negative pole to each cathode contact node in a time sharing mode; and

a time sharing frequency controller to control a time sharing frequency amongst the plurality of cathode contact nodes without a use of an arc sensor.

37. (Previously presented) The apparatus of claim 16, wherein the switch connecting the negative pole to each cathode contact node further comprises an electronic switch.

38. (Canceled)

39. (Canceled)